

REMARKS

In response to the Final Office Action of 04 December 2003, Applicant files this Submission along with a Request for Continued Examination and the fee set forth in 37 C.F.R. §1.17(e). Entry and consideration hereof is respectfully requested.

In the Office Action, the Examiner rejects pending claims 1-20 on prior art grounds. The Examiner, however, does not comment on claims 21 and 22, thus these claims are allowable over the cited art.

In reply to the rejection of claims 1-20, Applicant submits the present remarks which clearly demonstrate the patentability of the claimed invention.

Claims 1, 2, 5, 7, 8, 10, 11, and 15-17 are rejected under 35 U.S.C. §103(a) as being obvious in view of U.S. Patent No. 4,801,477 to Fudim in combination with U.S. Patent No. 5,790,297 to Berlin. In reply, Applicant submits that *prima facie* obviousness does not exist with respect to the relied upon references because each and every limitation of independent claims 1 and 15 is not taught by the relied upon references, because there is no suggestion or motivation to combine and/or modify the references as proposed by the Examiner, and because there is no reasonable likelihood of success in obtaining the claimed invention via the Examiner's proposed combination. Thus, the rejection is improper under §103 and may not be maintained.

Turning first to claim 1, a rapid prototyping apparatus is recited comprising, *inter alia*, at least one light source for illumination of a cross section of a light-sensitive material

by at least two spatial light modulators of individually controllable light modulators. That is, present claim 1 recites a *plurality* of spatial light modulators each including a *plurality* of individually controllable light modulators. At least these elements are not taught or suggested by the Fudim and/or Berlin references. Thus, claim 1, and claims 2-14, depending therefrom are novel and non-obvious over Fudim and Berlin.

A non-limiting, exemplary embodiment of Applicant's invention is shown in Figure 1 and includes a container 1 for holding a liquid rapid prototyping material (RP), a rack 5 mounted movably thereon, a light source 6 supported by the rack 5 optically connected to at least two spatial light modulators contained within an illumination device 9. In one embodiment, each of the plurality of spatial light modulators comprises a number of individually controllable light modulators, such as, for example, micromechanical valves and/or shutters which are individually electrically controllable by connected control circuitry.

That is, the invention employs an optical network to distribute input light from a light source to multiple spatial light modulator arrangements, each arrangement comprising multiple individually controllable light modulators which then output specific modulated light to certain areas of the surface of a light sensitive material, as desired.

Turning now to Fudim, the reference is generally directed to a method and apparatus for making three-dimensional objects by photosolidification of photopolymers. As conceded by the Examiner at page 3, lines 1-2 of the Office Action, Fudim fails to teach or suggest at least two spatial light modulators of individually controllable light

modulators, as recited by Applicant's invention. For this element, the Examiner relies upon the Berlin reference.

Berlin, however, fails to remedy the deficiencies of Fudim. Particularly, Berlin merely teaches a single two-dimensional array consisting of a plurality of light transmitting or light reflecting elements. That is, Berlin fails to teach a *plurality* of spatial light modulators each including a *plurality* of individually controllable light modulators.

Turning with specificity to Berlin, the reference teaches a fault tolerant display system 10, as shown in Figure 1, capable of supporting mechanisms for mechanically or optically compensating for failed, defective, or intermittently operating pixels in a display. Col. 5, lines 18-40. The system 10 consists of a fixed substrate 12 with an element 14 disposed thereon capable of movement in directions 16 and 18. *Id.* A display system 20/40 is fixed atop the movable element 14. *Id.* The display system 20/40 is either a transmissive system including an array 24 of light transmissive display elements 28 or a reflective system including an array 42 of pivotal mirrors 44. *Id.* In operation, the transmissive display elements 28 can be selectively controlled to absorb or transmit incident light from a light source 50, whereas the pivotal mirrors 44 can selectively alter a reflective direction of the light from the light source 50. *Id.*

The system 10 acts to compensate for failures of certain display elements 28/44 by using the movable element 14 to displace rows or columns of the display elements 28/44 or the entire array 20/40, accordingly. Col. 6, lines 41-50; Col. 1, lines 47-66; etc.

In sum, Berlin teaches a single movable array 20/40 of display elements 28/44.

In the Office Action, the Examiner asserts that “Berlin teaches an array of light modulators that are individually controllable...” As discussed above, Berlin discloses an array 20/40 of display elements 28/44 which selectively transmit or reflect light.

This, however, is not analogous to Applicant’s claimed invention. Claim 1 clearly recites *at least two spatial light modulators of individually controllable light modulators*. That is, claim 1 requires a *plurality* of spatial light modulators each including a *plurality* of individually controllable light modulators. This arrangement is not taught or even suggested by Berlin. The reference is strictly limited to a single array of light transmitting or light reflecting elements. Thus, Berlin clearly does not remedy the deficiencies of Fudim.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally the prior art reference(s) must teach or suggest all the claim limitations. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988); *In Re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970); *Amgen v. Chugai Pharmaceuticals Co.*, 927 U.S.P.Q.2d 1016, 1023 (Fed. Cir. 1996).

The Examiner’s proposed combination/modification of references fail to satisfy any of the required elements of *prima facie* obviousness with respect to claim 1.

First, as set forth above, the Fudim and Berlin references, taken singularly or in combination, do not teach or suggest “at least two spatial light modulators of individually controllable light modulators”, as recited in claim 1.

Second, there is no suggestion or motivation in the references, or in the knowledge available in the art, to combine or modify the references as proposed by the Examiner.

In the Action, the Examiner contends that Berlin’s use of an array of light modulators promotes energy efficiency and thus modification of Fudim based upon Berlin would have been obvious to provide improved energy efficiency to Fudim’s operations. However, Fudim seeks to remedy the limitations of common methods of forming three-dimensional objects by solidification, these limitations including: cost, complexity, shrinkage, geometrical distortion, etc. Col. 1, lines 34-60. Fudim is not specifically concerned with energy efficiency. Thus, the Examiner’s argument for the required motivation to combine and modify the references lacks merit.

The references, when viewed by themselves and not in retrospect, must suggest the invention. *In Re Skoll*, 187 U.S.P.Q. 481 (C.C.P.A. 1975). Clearly, neither the Fudim nor Berlin references suggest the Examiner’s combination and modification.

Finally, since the Fudim and Berlin references, taken singularly or in combination, fail to teach or suggest all of the limitations of claim 1, and since there exists no suggestion or motivation to combine and/or modify the references, then clearly there exists no reasonable *likelihood of success* in forming the claimed invention via the Examiner’s proposed combination.

Accordingly, *prima facie* obviousness of claim 1 is not found with respect to the Fudim and Berlin references. Claim 1 is not further rejected and is thus allowable to Applicant.

Claims 2-14, 18, and 20 are rejected under §103 as being obvious over various combinations of Fudim, Berlin, and U.S. Patent Nos. 4929402, 5593351, and 6051179 to Hull, Penn, and Hagenau, respectively. However, these claims variously depend from allowable claim 1 and are thus correspondingly allowable.

Claim 15 is also rejected under §103(a) as being obvious over the Fudim and Berlin references. Claim 15 recites a method of manufacturing a three dimensional object comprising, *inter alia*, “at least one light source illuminating a cross section of a light-sensitive material by at least two modulator arrangements of individually controllable light modulators...” (Emphasis added.) As described above, these claim elements are not taught or suggested by Fudim and/or Berlin, nor is there a suggestion or motivation to combine and/or modify the references to form the claimed invention, nor is there a reasonable likelihood of success in doing so. Thus, for at least the reasons set forth above with respect to claim 1, *prima facie* obviousness of claim 15 does not exist with regard to the Fudim and Berlin references. Claim 15 is not further rejected and is thus allowable. Claims 16 and 17 depending therefrom are correspondingly allowable to Applicant.

Claim 19 has been previously cancelled.

Claims 21 and 22, as mentioned, are not rejected nor objected to by the Examiner and are thus allowable to Applicant.

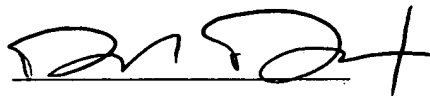
Accordingly, all pending claims 1-18 and 20-22 are now in condition for allowance. Reconsideration and withdrawal of all outstanding rejections and prompt issuance of a Notice of Allowance are respectfully requested.

No new matter is entered by these Remarks and no new issues for consideration are presented; the claimed invention is merely described and clarified. Thus no additional search by the Examiner is required.

The Examiner is invited to contact Applicant's attorney at the below-listed phone number regarding this Response or otherwise concerning the present application.

If there are any charges due with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130 maintained by Applicant's attorneys.

Respectfully submitted,
CANTOR COLBURN LLP

By: 

Daniel F. Drexler
Registration No. 47,535
CANTOR COLBURN LLP
55 Griffin Road South
Bloomfield, CT 06002
Telephone: 860-286-2929
Facsimile: 860-286-0115
Customer No. 23413

Date: APR. 05-2004